

SCIENCE & SPACE

Research points to link between thinking, doing

Findings could lead to better prosthetic devices

By Marsha Walton

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(CNN) -- Scientists are turning monkeys' thoughts into actions, a potentially significant step toward helping paralyzed people control their own activities.

In a lengthy study with three healthy rhesus monkeys, neuroscientist Richard Andersen and his colleagues discovered that advanced prosthetics allowed the animals to position a cursor on a computer screen just by thinking about reaching for that position.

"A patient who is paralyzed can still think about making movements," said Andersen, a researcher at the California Institute of Technology in Pasadena.

"If they can't speak they can still often think about the words they would like to say. What this research shows is that some of those signals can be directly read out from the brain," he said.

Harnessing those signals could allow people to control devices such as computers, robotic arms or cars.

Earlier research has focused on the area of the brain that's actually involved in moving a part of the body. The new study focused on a different location, the place where the brain first comes up with the idea that it wants to move a toe or an arm.

Andersen says the best prosthetic devices will be designed by sampling many different areas of the brain to best determine what a paralyzed person wants. Eavesdropping on brain waves could work like reading body language, to make sure the person is comfortable and has the proper tools to accomplish a particular task.

The monkeys used in the study had sets of fine wires, about the size of human hairs, surgically implanted in their brains. Their brain waves were monitored as the animals learned to reach toward a target on a computer screen, then learned to just think about reaching for it. The animals got rewards of sips of juice when they thought correctly.

Rhesus monkeys are "very, very smart" Andersen said, and their brains are similar to humans.

"They are extremely clever, and we can train them in a number of very complicated tasks," he said. The three animals involved in the study have been retired to an animal sanctuary.

Christopher Reeve's Paralysis Foundation provided some funding for the Caltech study, the results of which were published in the journal *Science*.

Reeve was paralyzed in a horseback-riding accident in 1995. His interest in brain research "has certainly been great for the field," Andersen said.

Some brain- and muscle-communication devices already exist for patients "locked in" by paralysis, strokes, and ALS, or Lou Gehrig's disease.

"We do this in several ways, either by connecting directly from the brain or from other modalities like muscle activity, eye movements, or microswitches," said Dr. Philip Kennedy, CEO and chief scientist at Neural Signals Inc., in Atlanta, Georgia.

Different parts of the brain are damaged depending on what injury or illness a person has. Kennedy says an MRI is done to determine what parts of the brain are still active and where electrodes should be implanted. Those functional brain waves are transmitted wirelessly and can ultimately be used to move a cursor, turn a switch or stimulate a movement.

Kennedy says people in the early stages of a disease such as ALS can learn to use devices before their physical condition deteriorates. That could give them more options as their disease progresses.

Both Kennedy and Andersen said their field of research is enormously satisfying.

"All of our patients have been really, really ill, and they are just really brave people, and I just have to admire them," Kennedy said.



Rhesus monkeys in the study could move a cursor simply by thinking.

